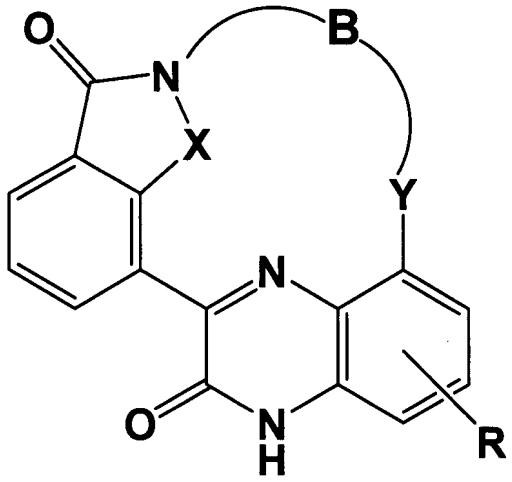
AMENDMENTS TO THE CLAIMS

1. (Currently amended) A quinoxalinone derivative of the formula (I):



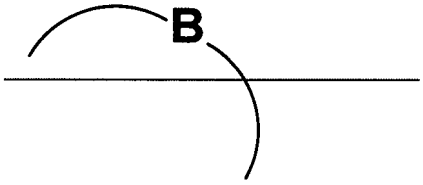
(I)

or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

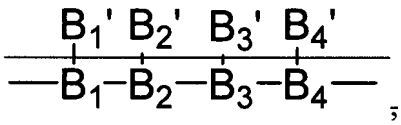
X is NH~~, S, O or CH_2~~;

Y is O or NR', wherein R' is hydrogen or lower alkyl;

~~the partial structure~~



~~is the following formula:,~~



~~wherein B_1, B_2, B_3 and B_4 are each independently CH, CR_0, N or O, wherein when B_1, B_2, B_3 and B_4 are each independently O, then B'_1, B'_2, B'_3 and B'_4 are each taken together with B_1, B_2, B_3 and B_4, respectively, to form O, with the proviso that two or more members of B_1, B_2, B_3 and B_4, at the same time, are not taken together with B'_1, B'_2, B'_3 and B'_4, respectively, to form O; and~~

~~R_0 is lower alkyl, and~~

~~B'_1, B'_2, B'_3 and B'_4 are each independently hydrogen, halogen, hydroxy, oxo, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, lower alkyl or lower alkenyl, wherein~~

~~said lower alkyl and said lower alkenyl may be substituted with one or more, same or different substituents selected from the group consisting of hydroxy, lower alkoxy, amino and lower alkylamino, and~~

~~among B'_1, B'_2, B'_3 and B'_4,~~

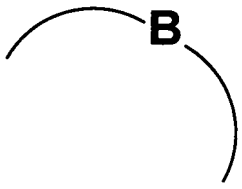
~~B'_1 and B'_3 taken together with B_1, B_2 and B_3,~~

~~B'_2 and B'_4 taken together with B_2, B_3 and B_4, or~~

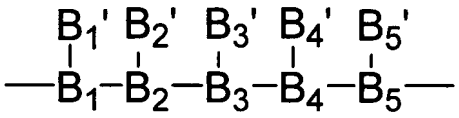
~~B'_1 and B'_4 taken together with B_1, B_2, B_3 and B_4~~

~~may form a C_5-C_6 cycloalkyl or an aliphatic heterocyclic group selected from the substituent group β_1 mentioned below, and said cycloalkyl and said aliphatic heterocyclic group may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group α mentioned below; or~~

the partial structure



is the following formula:



,

wherein

B_1, B_2, B_3, B_4 and B_5 are each independently CH, CR_0, N or O, wherein

when B_1, B_2, B_3, B_4 and B_5 are each independently O, then B'_1, B'_2, B'_3, B'_4 and B'_5 are each taken together with B_1, B_2, B_3, B_4 and B_5, respectively, to form O, with the proviso that two or more members of B_1, B_2, B_3, B_4 and B_5, at the same time, are not taken together with B'_1, B'_2, B'_3, B'_4 and B'_5, respectively, to form O; and

R_0 is lower alkyl, and

B'_1, B'_2, B'_3, B'_4 and B'_5 are each independently hydrogen, halogen, hydroxy, oxo, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, lower alkyl or lower alkenyl, wherein

said lower alkyl and said lower alkenyl may be substituted with one or more, same or different substituents selected from the group consisting of hydroxy, lower alkoxy, amino and lower alkylamino, and

among B'_1, B'_2, B'_3, B'_4 and B'_5,

B'_1 and B'_3 taken together with B_1, B_2 and B_3,

B'_2 and B'_4 taken together with B_2, B_3 and B_4,

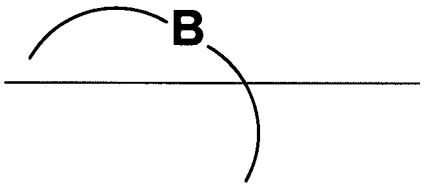
B'_3 and B'_5 taken together with B_3, B_4 and B_5,

B'_1 and B'_4 taken together with B_1, B_2, B_3 and B_4, or

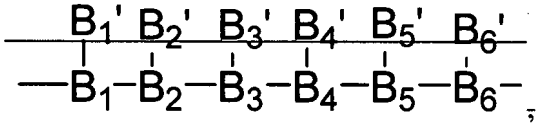
B'_2 and B'_5 taken together with B_2, B_3, B_4 and B_5

may form a C_5-C_6 cycloalkyl or an aliphatic heterocyclic group selected from the substituent group β_1 mentioned below, and said cycloalkyl and said aliphatic heterocyclic group may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group α mentioned below; ~~or~~

~~the partial structure~~



~~is the following formula:~~



~~wherein~~

~~B_1, B_2, B_3, B_4, B_5 and B_6 are each independently CH, CR_0, N or O, wherein~~

~~when B_1, B_2, B_3, B_4, B_5 and B_6 are each independently O, then B'_1, B'_2, B'_3, B'_4, B'_5 and B'_6 are each taken together with B_1, B_2, B_3, B_4, B_5 and B_6, respectively, to form O, with the proviso that two or more members of B_1, B_2, B_3, B_4, B_5 and B_6 ,at the same~~

~~time, are not taken together with B'_1, B'_2, B'_3, B'_4, B'_5 and B'_6, respectively, to form O; and~~

~~R_0 is lower alkyl, and~~

~~B'_1, B'_2, B'_3, B'_4, B'_5 and B'_6 are each independently hydrogen, halogen, hydroxy, oxo, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, lower alkyl or lower alkenyl, wherein~~

~~said lower alkyl and said lower alkenyl may be substituted with one or more, same or different substituents selected from the group consisting of hydroxy, lower alkoxy, amino and lower alkylamino, and~~

~~among B'_1, B'_2, B'_3, B'_4, B'_5 and B'_6,~~

~~B'_1 and B'_3 taken together with B_1, B_2 and B_3,~~

~~B'_2 and B'_4 taken together with B_2, B_3 and B_4,~~

~~B'_3 and B'_5 taken together with B_3, B_4 and B_5,~~

~~B'_1 and B'_4 taken together with B_1, B_2, B_3 and B_4, or~~

~~B'_2 and B'_5 taken together with B_2, B_3, B_4 and B_5~~

~~may form a C_5-C_6 cycloalkyl or an aliphatic heterocyclic group selected from the substituent group β_1 mentioned below, and said cycloalkyl and said aliphatic heterocyclic group may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group α mentioned below;~~

R is hydrogen, lower alkyl, lower alkenyl, amino in which the nitrogen atom is di-substituted with R_a and R_b, amino-lower alkyl in which the nitrogen atom is di-substituted with R_a and R_b, or L, wherein R_a and R_b are each independently hydrogen, lower alkyl, lower alkoxyalkyl or halogenated lower alkyl, and L is L_1-L_2-L_3, wherein L_1 is a single bond, $-(CH_2)_{k1}-$, $-(CH_2)_{k1}-O-$ or $-(CH_2)_{k1}-NH-$, in which k1 is an integer of 1 to 3; L_2 is a single bond or $-(CH_2)_{k2}-$, in which k2 is an integer of 1 to 3; and L_3 is lower alkyl, lower alkoxy, C_3-C_6 cycloalkyl, phenyl, pyridyl, pyrrolidinyl or piperidinyl, said lower alkyl, lower alkoxy, C_3-C_6 cycloalkyl, phenyl, pyridyl, pyrrolidinyl or piperidinyl being optionally substituted with one or more fluorine atoms; or alternatively

R is a substituent selected from the substituent group α mentioned below, which may be substituted with one or more, same or different substituents selected from the

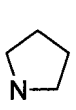
substituent group γ mentioned below, or R is lower alkyl substituted with said substituent; or alternatively

R is a cyclic group selected from the substituent group β_2 mentioned below, which may be substituted with one or more, same or different substituents selected from a lower alkyl, the substituent group α mentioned below and the substituent group γ mentioned below and also which may be substituted with J, wherein J is J_1-J_2-J_3; J_1 is a single bond, -C(=O)- , -O- , -NH- , -NHCO- , $-(CH_2)_{k3}-$ or $-(CH_2)_{k3}$-O- , in which k3 is an integer of 1 to 3; J_2 is a single bond or $-(CH_2)_{k4}-$, in which k4 is an integer of 1 to 3; and J_3 is lower alkyl, lower alkoxy, $-CONR_aR_b$, wherein R_a and R_b each have the same meaning as defined above, phenyl, pyridyl, pyrrolidinyl or piperidinyl, said lower alkyl, lower alkoxy, phenyl, pyridyl, pyrrolidinyl or piperidinyl being optionally substituted with one or more fluorine atoms, or R is lower alkyl substituted with said cyclic group, and

in the above, the substituent group α, the substituent group β_1, the substituent group β_2 and the substituent group γ each have the meanings shown below:

the substituent group α is a member selected from the group consisting of hydroxy, hydroxy-lower alkyl, cyano, halogen, carboxyl, lower alkanoyl, lower alkoxycarbonyl, lower alkoxy, lower alkoxyalkyl, amino, lower alkylamino, lower alkylsulfonyl, halogenated lower alkyl, halogenated lower alkoxy, halogenated lower alkylamino, nitro and lower alkanoylamino,

the substituent group β_1 is a member selected from the group consisting of



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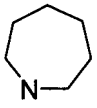

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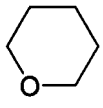
and


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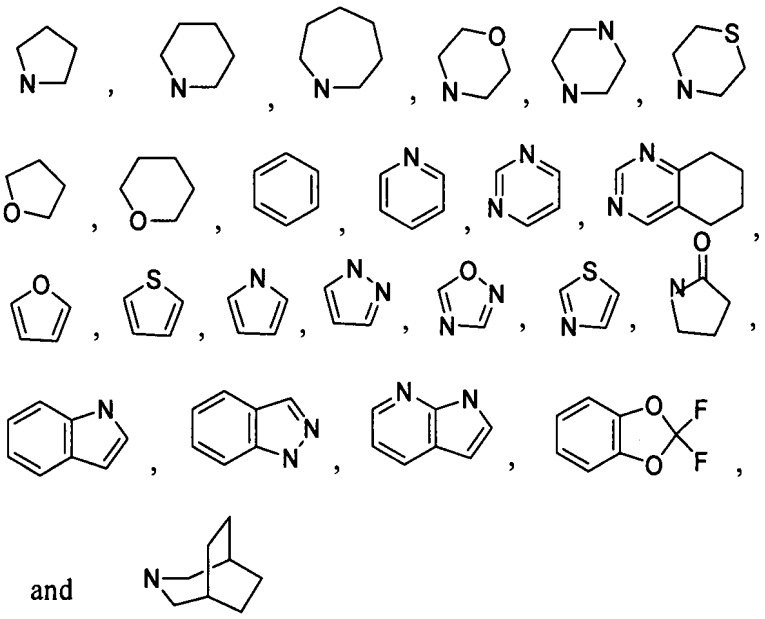
the substituent group β_2 is a member selected from the group consisting of



and

and

the substituent group γ is a member selected from the group consisting of C_3-C_6 cycloalkyl, lower alkyl substituted with C_3-C_6 cycloalkyl, phenyl, lower alkyl substituted with phenyl, pyridyl, pyrrolidinyl and piperidinyl, said C_3-C_6 cycloalkyl, phenyl, pyridyl, pyrrolidinyl and piperidinyl being optionally substituted with one or more fluorine atoms.

2. (Currently amended) The compound according to claim 1 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

X is NH ~~or S~~; and

Y is O.

3. (Canceled)

4. (Currently amended) The compound according to claim ~~3~~ 2 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

B_1, B_2, B_3, B_4 and B_5 are each independently CH; or

B_1, B_2, B_4 and B_5 are each independently CH, and B_3 is N or O.

5. (Currently amended) The compound according to claim 4 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

the substituent group α is selected from hydroxy, hydroxy-lower alkyl, halogen, lower alkoxycarbonyl, lower alkoxy, lower alkoxyalkyl, lower alkylamino, methyl substituted with one to three fluorine atoms, methoxy substituted with one to three fluorine atoms and lower alkylamino substituted with one to three fluorine atoms; and the substituent group β_1 is

6. (Currently amended) The compound according to claim 5 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

B_1, B_2, B_4 and B_5 are each independently CH, B_3 is N, and

(a) all of B'_1, B'_2, B'_3, B'_4 and B'_5 are hydrogen; or

(b) one of B'_1, B'_2, B'_3, B'_4 and B'_5 is lower alkyl or lower alkenyl, and all the others are hydrogen; or

(c) at least two of B'_1, B'_2, B'_3, B'_4 and B'_5 are each independently lower alkyl or lower alkenyl, and all the others are hydrogen; or

(d) among B'_1, B'_2, B'_3, B'_4 and B'_5,
B'_1 and B'_3 taken together with B_1, B_2 and B_3,
B'_2 and B'_4 taken together with B_2, B_3 and B_4, or
B'_3 and B'_5 taken together with B_3, B_4 and B_5,
form an aliphatic heterocyclic group selected from the substituent group β_1, wherein said aliphatic heterocyclic group may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group α,
and the others are hydrogen, lower alkyl or lower alkenyl.

7. (Currently amended) The compound according to claim 6 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

X is NH;

B_1, B_2, B_4 and B_5 are each independently CH, and B_3 is N;

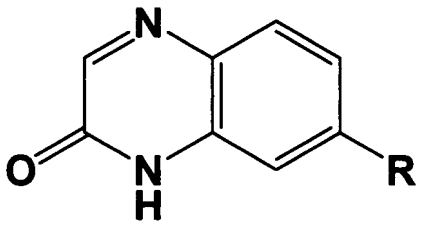
among B'_1, B'_2, B'_3, B'_4 and B'_5,

B'_1 and B'_3 taken together with B_1, B_2 and B_3 form an aliphatic heterocyclic group selected from the substituent group β_1, wherein said aliphatic heterocyclic group may be substituted with lower alkyl, and the others are hydrogen.

8. (Canceled)

9. (Currently amended) The compound according to claim 6 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

the R binds to quinoxalinone as described in the following formula:



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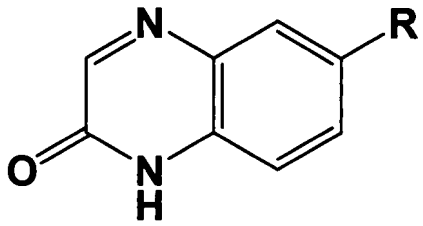
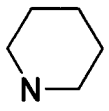


10. (Currently amended) The compound according to claim 9 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

R is hydrogen, amino-lower alkyl in which the nitrogen atom is di-substituted with R_a and R_b, or L, wherein R_a and R_b are each independently lower alkyl, and L is L_1-L_2-L_3 , wherein L_1 is a single bond, $-(CH_2)_{k1}-$, $-(CH_2)_{k1}-O-$ or $-(CH_2)_{k1}-NH-$, in which k1 is an integer of 1 or 2; L_2 is a single bond or $-(CH_2)_{k2}-$, in which k2 is an integer of 1 or 2; and L_3 is lower alkoxy or C_3-C_6 cycloalkyl; or

R is a cyclic group selected from the substituent group β_2, which may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group α, or R is lower alkyl substituted with said cyclic group, wherein the substituent group β_2 is selected from



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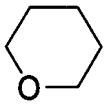

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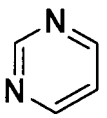

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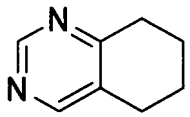
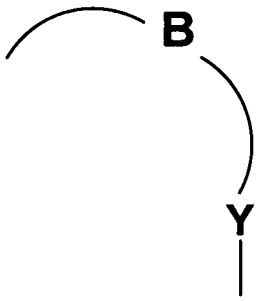


,

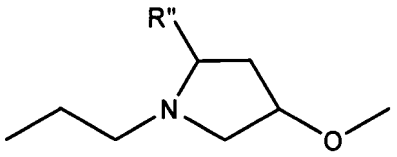
and the substituent group α is selected from halogen, lower alkoxy, lower alkoxyalkyl, methyl substituted with one to three fluorine atoms, and methoxy substituted with one to three fluorine atoms; or lower alkyl substituted with a substituent selected from the group consisting of lower alkylamino and lower alkylamino substituted with one to three fluorine atoms.

11. (Currently amended) The compound according to claim 2 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

the partial structure



is selected from the group consisting of



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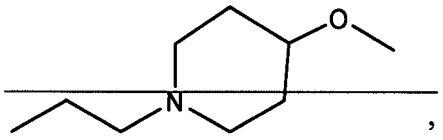

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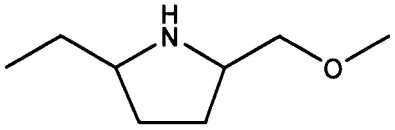

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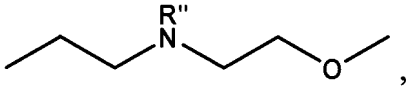

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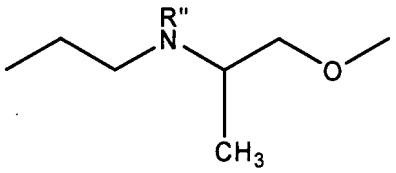

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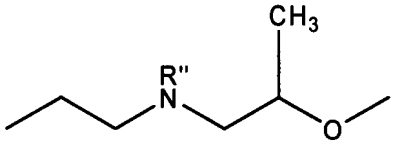
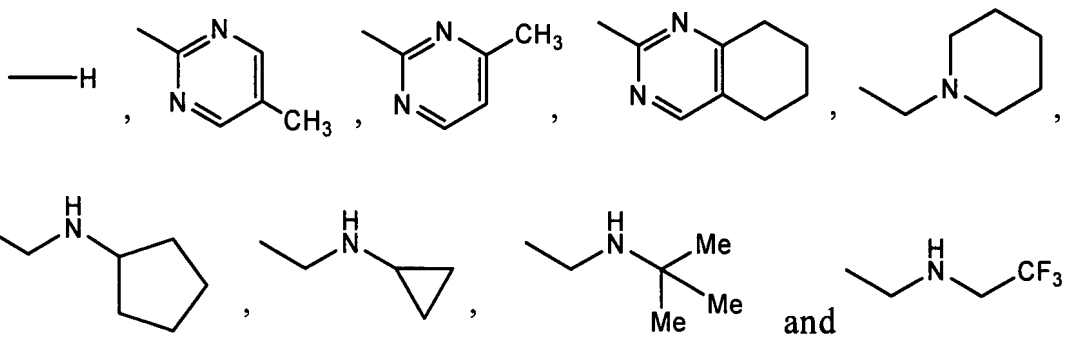


,

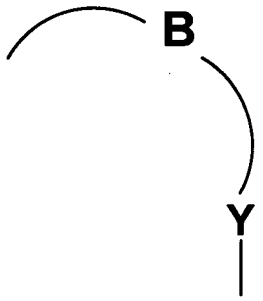
wherein R" is hydrogen or methyl; and

R is selected from the group consisting of

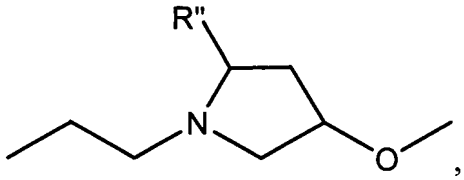


12. (Currently amended) The compound according to claim 11 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

X is NH; and the partial structure



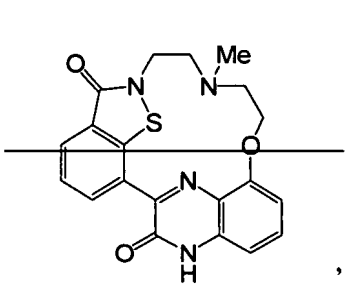
is the formula:



wherein R" is methyl.

13. (Currently amended) The compound according to claim 1 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

the quinoxalinone derivative is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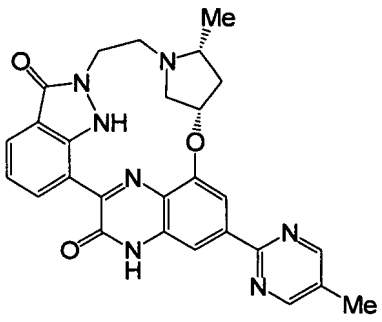
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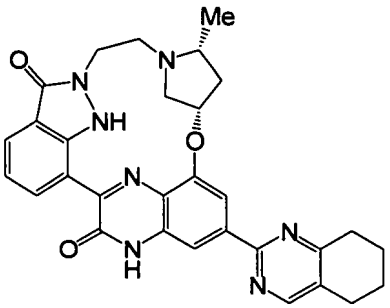
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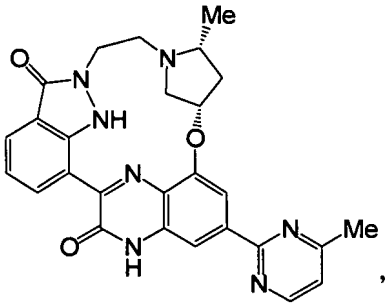
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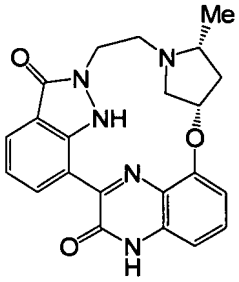
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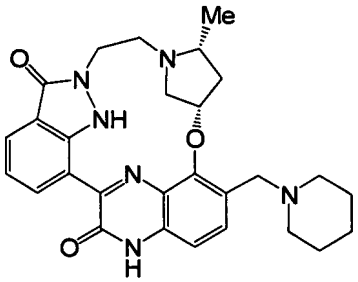
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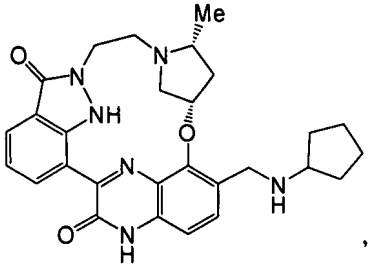
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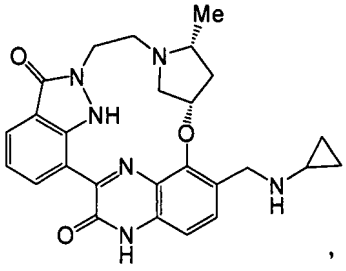
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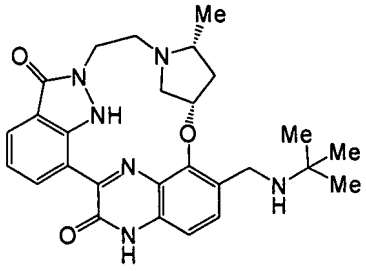
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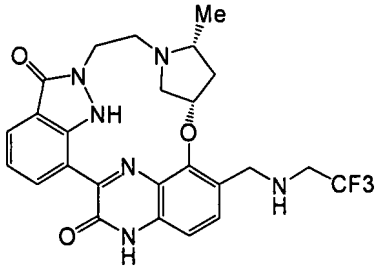
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14. (Currently amended) A pharmaceutical composition comprising ~~one or more kinds of the~~ a quinoxalinone derivative according to claim 1 as an active ingredient, together with a pharmaceutically acceptable carrier or diluent.

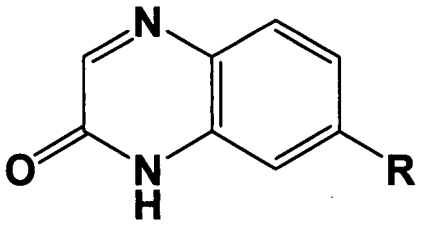
15. (Currently amended) A method of inhibiting ~~Cdk~~ Cdk4, which comprises administering to a patient in need thereof a therapeutically effective amount of ~~one or~~

~~more kinds of the~~ a quinoxalinone derivative according to claim 1 as an active ingredient, together with a pharmaceutically acceptable carrier or diluent.

16. (Currently amended) A method for treatment of cancer selected from the group consisting of glioma (blastoma), breast, lung, gastrointestinal, endometrial, leukemia, head and neck, liver, ovary or testicular, and mesothelima, which comprises administering to a patient in need thereof a therapeutically effective amount of ~~one or more kinds of the~~ a quinoxalinone derivative according to claim 1 as an active ingredient, together with a pharmaceutically acceptable carrier or diluent.

17. (Currently amended) The compound according to claim 7 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

the R binds to quinoxalinone as described in the following formula:



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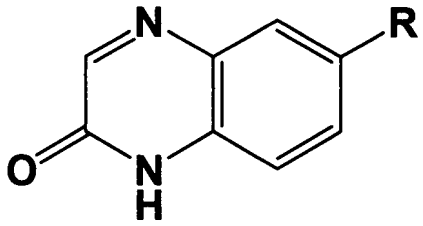

18. (Canceled)